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E-mail and the Flow of Information in an Organization: An Investigation within an Academic Institution

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**E-mail and the Flow of Information in an Organization:
An Investigation within an Academic Institution**

A Thesis

Presented to the

Department of Communication

and the

Faculty of the Graduate College

University of Nebraska

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

University of Nebraska at Omaha

by

Alicia Caldwell

December, 1997

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THESIS ACCEPTANCE

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Master of Arts, University of Nebraska at Omaha.

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ABSTRACT

The focus of this thesis is e-mail as a tool for the dissemination of information. Literature on e-mail has suggested that e-mail might influence and change communication patterns such as socialization, interdependence, and attention focus. Specifically, this study examined hierarchical similarities/differences in e-mail transmission and reception and user's perceptions within an academic institution. Variables studied for their effect include the number of messages sent and received, gender, attention a message is given, message subject matter, message origination, whether participants felt that technology inhibits or enhances communication and whether there were differences between hierarchical levels.

Among results were the following. For all messages and internal messages (examined independently) sent and received, as the receiver's status decreased, the sender's status generally increased -- the same pattern as seen with traditional organizational messages. Differences were found in the attention a message is given in that more messages were read entirely from superiors, peers, and subordinates than from those whose status could not be identified. Messages received from those whose status could not be identified were more often scanned. One of the few gender differences found was that females received significantly more messages from females than did males. Additionally, participants who use e-mail, in general felt that e-mail was perceived as enhancing communication.

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CHAPTER 1

Introduction

Around the turn of the 20th century, Alexander Graham Bell's dream of communication across a distance came true for many individuals living in larger cities. The creation of the telephone was an invention that led the way for individuals to enjoy alternatives to face-to-face oral communication. Since then, society has developed the communication process through more technological advances, including the computer. The use of computers has prompted such rapid growth that many users, developers, and regulators can't keep up with this information super-highway. One form of this technology affecting communication is electronic mail or e-mail. This form of communication via the computer allows access across the globe when simply using an electronic network, e.g. America Online. It creates new internal, organizational communication networks for users to gather, send, receive, and generate information from other networks. The traditional organizational network system (formal versus informal) which the general flow of information follows is virtually obsolete for many with the use of computer-mediated communication.

Computer-mediated communication (e-mail), a phrase that has been coined within the literature since communication has taken place via the computer, has brought about many issues that organizations were not prepared to handle. This speedy advancement has thrown organizations into forced technological training for employees as well as created new ideas about how to effectively communicate information to others more rapidly. Individuals may now log onto their organization's service network to get access to e-mail and other information sources almost as quickly as picking up the phone. This access has grown so rapidly that many businesses today are computer-mediated and highly advanced

technologically. Because of this rapid growth, traditional hierarchical structures that monitor the flow of information within organizations may experience internal conflict. Now employees can receive and send relevant or irrelevant information via e-mail and possibly get responses back the same minute, hour, or day.

Traditional hierarchical, structured networks contained "gatekeepers" at all levels and protocols for upward-flowing communication (Conrad, 1990; Barnes & Greller, 1994). Further, in traditional organizational structures, most information was sent downward. Upward communication was not appreciated or appropriate. Memos and meetings were used to disseminate information while gatekeepers were used to transmit information from subordinates to superiors. Today, however, individuals at any level can send messages to any other level via e-mail as long as the receiver is participating in a computer network. Individuals may send ideas, comments, or information to people around the world. This type of freedom needs to be examined so that organizations may learn how to understand and deal with problems that may occur within the organization. If organizations perceive advantages to computer-mediated communication, specifically e-mail, then possibly new organizational protocols will be designed to enhance communication. This freedom allows employees to communicate information more quickly to one another and with others outside the organization. Receiving important information more quickly could increase work performance and output. For management, an area of concern is how companies and managers will regulate this new found-freedom? Will they use it to enhance their dissemination of information and communication flows or will they see it as inhibiting overall work output? One concern is that many managers may not welcome such disregard for traditional hierarchical structure that accompanies this freedom of communication. They may frown upon the lack of gatekeepers to filter incoming information as well as transmit outgoing information for their supervisor. This

may cause conflict in organizations where the hierarchical status of individuals plays an important role in how they communicate and to whom they communicate.

Technological advances in organizations have brought about the need for reorganization and more advanced approaches to communication and work performance. Since today's organizations are being pushed into more advanced processes, there is a need now to examine technology's effect on the way organizations operate. From the traditional structure and flow of information to the new era of unrestricted access to information and more open communication, supervisors and business owners are faced with how to manage their organization's communication.

This thesis will examine e-mail users within a midwestern urban university, their hierarchical status, issues regarding perceived appropriateness of messages received, and if participants in the study perceive e-mail to enhance or inhibit their communication efforts and work performance. Information in this study may shed some light on the ever-increasing use of technology for communication and how this new form of electronic communication (e-mail) may affect the hierarchical flow of information throughout traditional networks within the organization.

Literature Review

COMMUNICATION TECHNOLOGY

In a world of ever-increasing communication technology, researchers have advanced many theories concerning the way we communicate. Because our communication strategies change to fit a given context, it is important to study just how technology might influence our strategies and affect the messages sent and received. One type of communication technology studied is computer-mediated communication (CMC), specifically e-mail, and how this technology might influence organizational communication. Although there are many types of computer-mediated communication, this thesis will examine e-mail as a tool for disseminating information. The effect of this technology will be examined regarding: 1) computer-mediated communication in organizations, 2) e-mail adoption as a productivity enhancing tool, 3) computer-mediated communication and gender, and 4) technology and group performance/decision making.

COMPUTER-MEDIATED COMMUNICATION IN ORGANIZATIONS

Communication technology today has emerged as being extremely important to the facilitation of communication in organizations around the world. This technology within organizations may aid in a more effective and productive environment than that of past years (Barnes & Greller, 1994). From the exchange of business cards and phone calls, faxes and meetings, computer-mediated communication has emerged as the new facilitator for message correspondence. This computer-mediated communication aids companies in

more efficient and effective message transmission. "Networking," which now refers to data sharing with others, is done through computer network links or "computer-networked systems" (Barnes & Greller, 1994, p.1; Forester, 1987). This technology has contributed to the sharing of information and enabled partnerships among companies and individuals. "As more and more organizations install computer networks, individual employees, small groups, departments and division personnel are using CMC as an alternative or supplement to face-to-face meetings, telephone conversations, memos and written correspondence" (Barnes & Greller, 1994, p. 2).

CMC in networked organizations (E-mail)

One of the most popular methods of computer-mediated communication is e-mail. By using e-mail, employees can send, store, and receive electronic messages by accessing their own e-mail address through a computer network. Such messages can be read, edited, and forwarded to other addresses (Kiesler, Siegel & McGuire, 1984). This ease of transmission has caused the re-definition of the workplace. No longer do employees have to have their office within the walls of the organization (Sproull & Kiesler, 1991b). Wherever one can hook up a computer and modem is where the work is done. Employees are also not limited to typical work hours. The use of e-mail can be done at anytime and virtually anywhere.

Because individuals no longer have to be in the office, CMC has contributed to a host of many other concerns for organizations. A lack of face-to-face communication or telephone communication has researchers examining the effects of CMC within the organization (Barnes & Greller, 1994). "E-mail is not as intrusive as a telephone call: it allows users to "table" their responses while they work on other tasks" (Spinuzzi, 1994, p. 213). When one is spoken to directly via telephone or face-to-face, a judgment can be

made as to one's race, gender, age, class, or competence level (Qureshi, 1995). Through CMC, however, an individual can no longer be seen or judged as in traditional, face-to-face communication. E-mail may in many cases be perceived to be quicker and easier for some messages. This is because e-mail is solely textual and allows the user to type without being interrupted by the dialogue of others (Spinuzzi, 1994). Much of the research indicates that e-mail has been shown to influence and change communication patterns such as socialization, interdependence, and attention focus. Through e-mail, one usually focuses on the written word and not on the relationship with the message sender (Kiesler, Siegel & McGuire, 1984).

Another concern is adapting to the changing environment that technology creates. Channel selection plays an important role for transmitting messages within the environment. "For it is obvious that the nature of the channel chosen to convey a message has an effect on the force of that message" (Rogers with Svenning, 1969, p. 145). When a person communicates via e-mail, he/she no longer needs to be concerned with gestures, facial expressions, or body movement as with all forms of writing. It eliminates the use of nonverbal symbols used in regular face-to-face communication. The concentration of communication shifts to that of a message and a keyboard. Although emotional context may be signaled in writing with symbols and/or styles, the affective elements of visual/oral communication is significantly decreased (Qureshi, 1995).

Since e-mail is sent directly to an employee's address, there is little use for secretaries or "gatekeepers" and the message directly infiltrates management. There may no longer be a need for protocols or bottom-up communication structures (Barnes & Greller, 1994). Managers and employees must also create and type their own messages. This freedom of access may encourage communication in organizations where it wasn't encouraged before (Connell & Galbraith, 1980). Employees taking advantage of such

freedom and sending messages up-ward within the hierarchy may be surprised someday to receive an answer from the president of the company changing the corporate culture and communication efficiency.

E-MAIL ADOPTION AS A PRODUCTIVITY ENHANCING TOOL

The use of e-mail has broadened over the last ten years to include business use, personal use, and community use. Through the use of computers, communication can be accessed, stored and sent globally. Today, most communication can be sent via e-mail or by other computer-assisted means. "E-mail reduces formality and makes it easy both to send messages to many people on the first dissemination and to pass messages along for second and third and higher order dissemination" (Hunter & Allen, 1992, p. 1).

Adoption

With the invention of e-mail, organizations and individuals have experienced more cost-effective ways of disseminating information internally and externally. From the large business which wishes to spread information globally to the smaller business that takes care of orders, customers, equipment, etc., e-mail has decreased spending and increased efficiency (Lewis, 1991). For organizations to adopt this new technology, they must see it as a wise investment that will save time and money and be accepted by employees. Organizations who adopt this new technology are hopeful that it will increase productivity and communication within the organization (Hunter & Allen, 1992; Burns, 1995; Lewis, 1991). Among faculty, use of information technology has been shown to increase collegial interaction and enhance professional development (Sandholtz et al., 1991). However, because the adoption of technology in organizations is hard to measure,

corporations may face high initial costs and reoccurring costs to keep up with the changing market, transitions to technology internally, and a difficulty in actually measuring productivity increases from technology (Goldhaber & Barnett, 1988). Through interpersonal communication, favorable attitudes can be created regarding the adoption of technological innovations (Rogers and Solo (eds.), 1972).

Although CMC may be more efficient, many organizations may find it difficult to move smoothly into this technological era. Adopting the use of this computer-mediated communication will cause many to become frustrated with the doors it opens. One problem may be the 24 hour access that e-mail provides. Just because one leaves the office does not mean the work is done (Verespej, 1995). E-mail allows employees and organizations to receive and send messages any time of the day or night (Barnes & Greller, 1994). This may cause a desire to overwork because of the competition in a given field. An average user may now send and receive between 20 and 100 messages a day--this number is increasing rapidly (Greengard, 1995; Sproull & Kiesler, 1991a). However, the typical worker in a large corporation can receive 160 e-mails a day which may lend itself to constantly checking and answering messages. Also, this electronic technology makes working at home much easier but mixes work with personal lives. Having such access may lead to an enormous amount of stress which is the leading cause of job-disability claims nationwide (Verespej, 1995).

Productivity enhancement

E-mail may increase productivity because it may be faster than dialing the telephone or writing a letter from scratch. "E-mail is so convenient, in fact, that users may elect to use this medium even when they could easily talk to the recipient instead" (Spinuzzi, 1994, p. 214). It aids in file organization and quicker message retrieval and

sending. It allows data to be reviewed and analyzed from across the office or across the globe. This ease of use allows virtually anyone to use e-mail without training or extensive computer knowledge (Greengard, 1995). One aerospace company, for example, now uses e-mail to send information from senior management simultaneously to all employees. Its goal is to avoid the omissions, errors, and filters of its previous system--weekly meetings in which project managers then transmitted information to the rest of the organization (Horowitz, 1994).

When communicating within an organization, employees often find barriers that reduce effective information transmission of important messages. One of these barriers is hierarchy or status differences. With the use of e-mail, users have found communicating to be easier and more efficient due to the lack of such barriers. Users can send messages without a threat of aggressive people monopolizing face-to-face conversations. Messages can be sent all over the organization without the worry of interruption or status differences (Perrolle, 1987). In particular, messages containing sensitive or controversial issues may not be appropriate for memo form. The opportunities for one speaker to control another are decreased. Also, the possibility for more equal participation by employees is increased. This leads to increased productivity and information sharing within the organization and beyond. E-mail as a productivity enhancing tool may increase free, effective communication, information dissemination, and overall productivity for individuals as well as organizations. However, CMC can hinder interaction causing lower accuracy and lower overall outcomes (Arunachalam & Dilla, 1995). Harriet Wilkins concluded in her study on e-mail conferencing that "messages are interactive discourse in textual form" (1991, p. 62). E-mail writers often type in thoughts in the order in which the thoughts occur to them--similar to speaking. Therefore, "e-text messages are similar

to spoken language" (Spinuzzi, 1994, p. 215). Further studies are needed to examine the effects of CMC (e-mail) on outcomes.

On the other hand, e-mail differs from written memos or letters in various ways. E-mail limits nonverbal interaction which creates problems for many writers because nonverbal symbols have always been important in communication. However, nonverbal or emotive affects have been adapted to text through italics, certain punctuation, illustrations, and/or with electronic text, through smiley faces (Spinuzzi, 1994). In formal printed text, meanings or moods could be created by editing or choosing certain language in order to foster an impression. With hand-written notes, the writer many times will include a symbol in order to be sure that the message and meaning is not misinterpreted (Spinuzzi, 1994). E-mail is different than written memos because many users are charged according to the time they spend writing--so they write more quickly (Horowitz and Barchilon, 1994). Additionally, many e-mail users are not accomplished writers and see no point in trying to hide the fact. Therefore, in order to transmit the tone or meaning of the message, users have transformed the smiley faces of written notes/memos into the electronic message. E-mail writers who type their thoughts in order the thoughts occur to them rather than arranging the thoughts in a particular order are mentally speaking. The typical e-text [e-mail] user does not reorganize the document as the typical text writer does (Spinuzzi, 1994). Most importantly however, e-mail may differ from written memos in that e-mail is rather new, uninhibited, ambiguous, and is usually more informal. However, companies are quickly learning the usefulness of e-mail etiquette and user policies that may help to manage and improve use. "Since e-mail writers cannot judge the readers' reactions to the messages, writers tend to write for themselves rather than for others" (Spinuzzi, 1994, p. 214).

COMPUTER-MEDIATED COMMUNICATION & GENDER DIFFERENCES

In an age of technology, researchers are quick to study effectiveness of CMC in many contexts. One context is the differences in user gender. The gender variable adds new insight to the discovery of possible differences in perception about CMC. Males and females may perceive the advantages or disadvantages of CMC differently. Only a few studies have investigated how gender might effect experiences and attitudes with technology. However, some researchers have found differences in ease of use, attitude, effectiveness, and satisfaction when gender is considered (Allen, 1995; Olaniran, 1995).

A case study of the corporate headquarters of Public Broadcasting Services (PBS) by Brenda J. Allen (1995) revealed differences in perception of experiences and attitudes of e-mail use. Females rated e-mail more highly on ease of use, effectiveness, and efficiency than did males. Females also felt the appropriateness of e-mail for certain types of messages was higher. This may be because females perceive the sharing of messages to be appropriate because of their socialization process. Women are more nurturing and supportive in sharing information with one another (Allen, 1995). Women at PBS may have deemed e-mail as appropriate for "getting messages through to someone whose calls are normally screened" because they realized that e-mail allows them to communicate without the "gender dynamics that often color other methods of interaction" (Allen, 1995, p.561). This allows them to possibly communicate without gender lines. This may also be why men accept traditional ways of communicating rather than e-mail because of their experience and ease in dealing with "gatekeepers". It seems that because women find e-mail to be a more effective, individualized, and potentially anonymous process, organizations might eventually become more willing to facilitate this perceived effectiveness of CMC (Olaniran, 1995). However, there is little research done in this area,

and further investigation may lead to a better understanding and increased use of CMC, specifically e-mail, within organizations.

CMC AND GROUP PERFORMANCE/DECISION MAKING

CMC and technology are influencing the way organization employees communicate with one another. By examining work groups, researchers can analyze how groups communicate effectively through the use of CMC, how participation and performance are affected by status, and how decision making is influenced.

Status

When groups participate in communication or decision making, it is usually clear that higher-status members carry more weight in the final decision. Research shows that higher-status members talk more than low-status members when participating in groups (Weisband, Schneider & Connolly, 1995). Members in groups assess and categorize other members, information about them, and develop expectations. "These perceptions then shape the members' interactions with one another...", opinions, and influence (Weisband et al., 1995, p. 1124). Higher status members initiate conversation and decision making in groups even when they do not have the particular expertise required. Equal participation in CMC is more apparent because of the lack of social contexts. Group members are less aware of the social differences of others in the group. This leads to more individualization and possible anonymity by participants. Thus, e-mail as a CMC, can actually influence or compliment the traditional mode of communication called face-to-face (Zack, 1994). It is through this electronic counter-part that group participants can possibly clarify, understand, share, and create communication among members.

Group productivity

When individuals are put into groups to work on a project and asked to use computer-mediated communication to facilitate task completion and decision making, there are many interesting outcomes. Research indicates that computer-mediated (CM) groups are less productive than face-to-face groups (Straus & McGrath, 1994). When productivity is important and time is short, face-to-face modes of communication are more effective for specific tasks requiring interdependence. This could be because CM groups may have more difficulty understanding one another's messages than the face-to-face groups regardless of the stored transcript (Straus & McGrath, 1994). However, CM groups are more effective in tasks like idea-generation where messages produced are instantly accessible.

Group decision making

When examining group decision making, scholars sometimes look at the process that produced the outcome. This is usually done by examining "the number of solutions considered, solution quality, and consensus" (Valacich & Schwenk, 1995, p. 160). By comparing CMC and face-to-face communication to decision making, researchers can determine the success of the mode used. According to Valacich & Schwenk's 1995 study, when CM groups were faced with idea-generation tasks, the solution alternatives produced were higher which was possibly due to the CM groups being able to work independently (p. 169-170). Subordinates who receive information through e-mail are given the ability to determine what action should be taken regarding the information they received rather than waiting to be told what to do. However, to enable employees to handle this responsibility, training must provide the knowledge needed to communicate effectively, understand responsibilities and carry out requests (Barnes & Greller, 1994).

To facilitate group decision making, members must be able to access and send information through an organized process. Using e-mail effectively and organizing files can save time. While the use of e-mail increases, rules are developed to help people effectively communicate in an organized manner (Barnes & Greller, 1994). One method to aid decision making in groups has been adapted electronically. Robert's Rules of Order now can guide groups through meetings conducted through e-mail (Berleant & Liu, 1995). The need for electronically-mediated group work within organizations has led to the results in group decision support software availability (Berleant & Liu, 1995).

Technological techniques used to increase quality in decision making reduces status and social cues as typical contextual concerns. Providing groups with enough information electronically could potentially reduce "groupthink" and "tunnel vision" in group decision making (Janis, 1972 in Kiesler, Siegel, & McGuire, 1984).

COMMUNICATION NETWORKS

In a world dominated by technology, organizations and individuals are having to adjust on a regular basis to new concepts, new structures, and more efficient ways of performing. In organizations, this has had an impact on traditional and contemporary communication networks. Organizational structure influences information flow through communication channels (informal/formal networks) and hierarchy. "Organizational structure...is viewed as a set of mechanisms for processing information--for subduing it, summarizing it, and simplifying it" (Scott, p. 113, In Goodman et al., 1990). An examination of the traditional meaning of communication networks within organizations and a more contemporary view of these networks and technology used today is necessary. A clarification of the two meanings will aid in the understanding and justification for future research in Computer Mediated Communication (CMC) networks. Organizational

structure and networks are discussed in terms of information flow, communication channels (informal/formal), hierarchy, diffusion of information through contemporary networks, and organizational support systems needed for CMC.

Traditional network theory

Organizations require structured communication channels to handle messages. These channels are called networks, "patterns of communication among the members" (Conrad, 1990, p.258). The messages that follow certain paths created by the organization's structure are called formal communication networks. They are established, accepted and traditionally follow a top down format. These networks facilitate the channeling of messages downward, upward, and horizontally across organizations (Tortoriello, Blatt & DeWine, 1978). Traditionally, there was little concern regarding communication because managers felt that if there was an efficient formal communication system, communication would be effective (Conrad, 1990).

Downward communication refers to orders or commands from superior to subordinate down the chain of command. Typically, there was little contact between decision makers and employees who carry out the decisions. Upper-level supervisors receiving these decisions then interpreted the messages and sent only what was needed down the structure. This led to possible distortion or filtering of information to the extent of alteration or ambiguity in some received messages. Subordinates often feel that they receive very little downward communication from supervisors, especially about their job performance or job expectations (Conrad, 1990). Employees often feel that they are kept in the dark regarding policy changes or general organizational information that would aid them in better work performance. Employees were often left to interpret messages sent down the chain which created the potential for misunderstanding.

Upward communication refers to messages sent from subordinates to superiors for clarification, knowledge, feedback, etc. Upward communication can often be hindered by factors such as power struggles, status differences between parties, mistrust between individuals, inaccurate perceptions, etc. (Conrad, 1990). This type of flow of information is also often restricted by the amount of hierarchical levels and the expected formality of the upward message. It was once felt that if supervisors allowed a free flow of information from bottom up, that upper-level managers would experience information overload being bombarded by messages. Therefore, it was expected that at each level some messages would be screened, eliminated, or altered. Because an individual's level represented his or her status within the organization, members rarely communicated with those of a different status. If communication was done, it tended to be very formal and usually written. Limitations placed on lower-level employees hindered any upward flow of information also. Limitations such as the time-consuming nature of formal communication according to the chain of command, ill feelings between the supervisor and the subordinate, and the fear of having to pass negative information to superiors were common reasons why the flow of information upward was minimal.

Horizontal communication is the transmission of messages across the organization to individuals on the same level. These messages serve to coordinate, solve problems, and develop information sharing (Conrad, 1990). This direction of communication was usually universally understood and used often. It is the channel that usually clarified ambiguity in orders or decisions passed down the chain of command. Members at this level usually relied on one another for this clarification rather than confronting a superior and admitting confusion or conflict.

Messages that do not follow traditional channels are known as informal messages. These messages make up the informal communication network often referred to as the

grapevine (Farace, Monge & Russell, 1977; Goldhaber & Barnett, 1988). It is developed "out of social relationships that exist among and between employees" (Tortoriello et al., 1978, p. 59). These networks can provide individuals with a sense of identity and self-respect within the organization. Networks are created by employees who are linked through consistent communication patterns. Networks may be made of "cliques, people (usually five to twenty-five members) who communicate more often with one another than with other people in the organization" (Conrad, 1990, p.169). In some instances, the cliques may be considered a sub-culture branching off of the dominate culture (Martin & Siehl, 1983). It is within these cliques that workers obtain valuable information and are able to offset any problems or conflicts that may arise from formal communication. Thus, the fostering of innovation may be encouraged when members share ideas, receive feedback, and gain support of those ideas through effective informal communication cliques (Conrad, 1990). Liaisons are people who connect the cliques but are not members of either group (Conrad, 1990). They help provide the group with information from other groups which aids in the dissemination of information throughout the organization's informal network.

Rumor is one type of information carried by the grapevine. Although rumor often has a negative connotation, corporations are learning of its value to the corporate culture and communication process. If used positively, the informal communication network can compliment the formal communication network in organizations. The informal network can often carry more information than the formal and can get the information there faster because it relies on social relationships. Such channeling can disseminate information through clusters more effectively (Johnson, 1993). By using these informal ties effectively, managers may be able to dissemination information quicker and with less inaccuracy. Also included within these networks are what are known as "gatekeepers"

(Conrad, 1990). These people are in a position to filter, alter, eliminate and/or control the messages going through the network, i.e. secretaries, receptionists, assistants, etc.

Present networks

In today's society, the term networks has come to mean networks as communication technology, mostly electronic networks excluding informal communication networks. Current researchers have called communication networks by a new name that deals with technology--computer networks. These computer networks are having a profound effect on the way both internal and external communication is carried out. From the use of e-mail to the Internet, companies are having to restructure their organizations to deal with this electronic freedom. Information is possibly disseminated differently as barriers are conquered, and traditional channels are being changed. According to current literature, hierarchical structures within organizations are becoming virtually extinct when it comes to CMC. "Due to its uniform format, e-text [e-mail] tends to flatten corporate hierarchies and increase informality among the different levels of the corporations" (Spinuzzi, 1994, p. 214).

STRUCTURAL CHANGES CAUSED BY NEW NETWORKS

Many researchers today are focusing on how computer networks affect relationships between managers and employees in the organizational environment (Sproull & Kiesler, 1991). Once studied for their efficiency and speed, computer-mediated networks are now studied for the impact on the environment and the potential change in communication patterns. Networks can create relationships that exist independently of physical location or hierarchical position. CMC in organizations decreases the use of social cues and allows free talk electronically (Kiesler, Siegel & McGuire, 1984). These networks facilitate information access and promote democracy within the corporate structure. Such technology may force organizations to reexamine their structure, communication channels, training procedures, management styles, and future technological advances. CMC, especially e-mail, can alter rhythms and patterns of typical social interactions (Mantovani, 1994).

Information flow

In traditional organizations, flow of information has primarily been viewed in terms of downward communication usually from superior to subordinate; a top-down perspective (Conrad, 1990). Because the transmission of accurate information is vital to an organization's effectiveness, electronic tools which aid in this dissemination must be examined. In a top-down structure, downward messages follow formal channels, i.e. memos, correspondence, letters, manuals, etc. The structure of an organization may directly affect the channel of information chosen. Although corporate culture often dictates channel use, technological networks may now offer other alternatives to the traditional form of "channels" (J. Johnson, Donohue, Atkin, & S. Johnson, 1994). Since

technology (CMC) has influenced much of organizational communication today, flow of information from top-down has changed and broadened. Employees now find that their reception of information is faster and allows individuals the power to interpret the message and act (Malone & Rockart, 1991). The use of CMC networks like e-mail will allow corporations broader options for information dissemination. Employee benefits information, news and other communication can all be disseminated via e-mail rather than memo. Verification of receipt of messages can also be accomplished through technology (Greengard, 1995). This increased access to information, which in turn allows easier dissemination, can provide human resource departments with powerful tools for the future.

Conversely, upward flow of information has been impacted as well. Although traditional upward message flow has been inhibited by "gatekeepers" or protocol, employees are finding easier access throughout the hierarchy using technological networks. These refined communication networks now facilitate upward communication usually without discrimination or interruption. Employees are able to talk more frankly to superiors through the use of networks (Sproull & Kiesler, 1991a). CMC was designed to eliminate the filtering of information so all levels of employees could access information when needed (Conrad, 1990). However, information overload may be increased due to the speed and amount of messages that can be sent. Here again, employees at every level are left to filter or scan messages for information that is relevant.

Equality within groups plays a distinct role when communicating electronically. CMC now allows less domination by one or two people during conversations among groups. Confirmation of this finding was a study conducted by Sproull & Kiesler (1991a) which indicated that "networked groups generated more proposals for action than did traditional ones" (119). However, this free flow of information among electronic

networks also may create problems in decision making. Sproull & Kiesler (1991a) also found that these networks hindered quicker decision making because of the inability to interrupt one another with ideas. Therefore, conflict was caused because of the domination by few members over the network to force decision making. Sproull & Kiesler (1991a) indicated that participants expressed more aggression and extreme opinions while communicating electronically than face-to-face (119).

Hierarchy

As corporations move into CMC, they may find a new strategy is in order. Through the use of technology such as e-mail, corporations are finding they have a lack of control over the flow of information. E-mail essentially has no boundaries unless individual organizations put them in place. Organizations using CMC, like e-mail, are finding that technology is changing the workplace and will thus require altering traditional roles of management and hierarchy (Barnes & Greller, 1994). "Social change is the process by which alteration occurs in the structure and function of a social system" (Rogers and Svenning, 1969, p. 3). The various individuals and groups that hold certain statuses are what constitute the structure. The invention of new ideas, and the diffusion of these ideas within the structure or social system begin the process. "Diffusion is the process by which innovations are communicated, via certain channels, to the members of a social system" (Rogers and Solo (eds.), 1972, p.90).

The adoption or rejection of the ideas effecting the social system will determine social change within the structure (Rogers and Svenning, 1969). Then, values will be restructured regarding communication as companies support technology. Organizations searching for a way to control the freedom of communication through technological networks may find that corporate discussion groups are useful (Gurak, 1995).

Many researchers conclude that technology may help to enhance or improve upward communication in organizations. Although there is the possibility of information overload, disinterest in messages from subordinates, or fewer people in higher level positions, top level management may find themselves unequipped to deal with this freedom in upward communication (Glauser, 1984). This type of effect is what is causing organizations to reexamine their hierarchical structure. Freedom to communicate electronically also allows subordinates to express themselves without status lines or personality conflicts (Sproull & Kiesler, 1991a). Therefore, employees who wish to take the "fast track" up the ladder based on their high performance may find it easier if they can be successful in communicating without being limited by hierarchical boundaries (McPhee & Corman, 1995). Employees who are effective in communicating via e-mail may take advantage of a lack of ability by top-level management to control and manage computer-mediated communication. This lack of experience in controlling and managing CMC may be the reason why some managers attempt to restrict increased CMC access to individuals especially for personal or nonprofessional use (e.g., policies restricting e-mail, list serves, on-line services, and/or anything not related to work).

DIFFUSION OF INFORMATION THROUGH NETWORKS

Contemporary networks allow for the diffusion of information more efficiently and effectively. These networks provide pathways through various communication software applications that may influence communication in any direction (top-down, horizontally, bottom-up) and further organizational productivity. The importance of technology and its effect on information transmission within organizations may lend support for needed improvements in innovation. From idea to production, supply to demand, departments to

management, marketing to sales, communication technology affects every phase of a corporation (PreiBl, 1995).

Strategic use

One form of strategic use for communication technology is the control of communication networks by corporations. These monopolizers attempt to exclude competitors access to information by controlling the networks that transmit the information. The rights to this information must then be sold or negotiations for use other than price will take place (PreiBl, 1995). Corporations who gain a competitive advantage will then need to make managerial changes in the organizational structure by implementing communication technology further. Also, this strategic use of technology will open new opportunities for organizations with renewed economic capabilities.

Strategic use of communication technology has found its way essentially by trial and error. Not many organizations develop further than just the adoption stage. By allowing departments to establish more external links, companies will facilitate the development of individual department network strategies. Also, when communication partners are involved in different groups and/or the ability of different departments to share information directly creates a more aggressive communication technology within the organization, then the entire organization can benefit as a whole (PreiBl, 1995).

Innovation

The use of contemporary networks to facilitate idea-generation indicates an increase in organizational innovation. Innovation occurs when ideas are generated within organizations. Communication networks created by technology aid in this innovation process. "Such ideas can range from administrative matters to technology in the

workplace" (Albrecht & Hall, 1991, p.273). Communication requires a collaboration of efforts by individuals to create products which in turn require support from others.

Computer-mediated communication allows networks to facilitate the sharing of ideas more efficiently. Through the diffusion of information, individuals create environments that welcome criticism and evaluation from others in the organization. Technology may aid in a more quick and efficient process of idea-generation, idea-sharing, and feedback.

However, corporations also experience delays between the development and implementation of new technological systems promising to make the organization run more smoothly. The effects of these new systems on the environment must be taken into account. Just adopting any technological system without regard to the social system of the organization may prove disastrous on innovation and productivity (Straus & McGrath, 1994). Technology today is consistently changing and requires users to keep up with the available systems and services provided by networks that serve the organization (Benson, 1994).

COMMUNICATION TECHNOLOGY AS SUPPORT FOR ORGANIZATIONS

By using communication networks to reduce transaction costs, corporations experience growth globally. By using advanced networking, businesses can interact electronically with few limitations. Such exchanging of information through networks allows businesses to operate more efficiently and effectively. The support of such networks creates an environment conducive to improving quality, efficiency, strategic advantages, knowledge and expertise, and promotes reorganization of networks and teams for success. Support through technology creates new possibilities for organizations to do things better in different ways (Cecez-Kecmanovic, 1994).

The use of technology may have an impact on how communication is affected regarding task completion and message transmission. By examining electronic mail as a potentially rich medium with the ability to reduce task ambiguity within organizations, managers and employees may find this technology useful. Media richness theory proposes that a primary objective of organizational participants is to reduce ambiguity through media selection (Schmitz & Fulk, 1991). The selection of certain communication media is an important factor in how these organizations can reduce task and communication ambiguity. However, just because a particular medium may be relatively rich does not mean that employees will choose to use e-mail in all situations. The selection of the medium may be based more on the purpose of the message, and how the medium chosen may symbolize that purpose, i.e. "typed or word-processed media symbolize formality, handwritten notes transmit personalness, and face-to-face conveys openness" (Schmitz & Fulk, 1991, p. 489). The media richness model explained by (Daft & Lengel, 1984, 1986; Trevino, Daft, & Lengel, 1990; Trevino, Lengel, & Daft, 1987) is defined as:

...media that has the capability of "(a) facilitating feedback, (b) communicating multiple cues, (c) presenting individually tailored messages, and (d) using natural language to convey subtleties. The rank order of media in terms of richness is face-to-face, telephone, electronic mail, personal written text (letters, memos), formal written text (documents, bulletins), and formal numeric text (computer output).

Another form of organizational support is group decision support systems (GDSS). GDSS has been studied to see if there are better ways technology can support employees' decisions. One study by Alavi (1994) indicated that collaborative learning through the use of GDSS increased learning capabilities among undergraduate student participants. This research indicates new approaches for the support of CMC within

organizations. GDSS may facilitate increased training and support systems available to employees through technology (Alavi, 1994). Employers might then have the ability to improve group decisions and output through the use of advanced technology.

However, as organizations implement support systems, they face the challenges of adaptation to newer technologies. A study by Dubravka Cecez-Kecmanovic in 1994 outlined social exchanges (communication) between humans as "activities." This distinction, "activities," led to the realization that through activity processes, individuals require more information and communication availability for technology adaptation than is required for more general tasks. Through interconnected technology, organizations can provide various kinds of service. This increase in concern for support of technological environments has caused improved transmission of information, both internally and externally, for organizations (Cecez-Kecmanovic, 1994). It has also increased the efficiency of decision-making processing in general.

Researchers indicate that the expansion of networks globally will provide increased economic support for users (Garcia, 1995). Although it is not certain, many are hopeful that increased access, potential expansion of economic opportunities, and less restrictions will give way to an expanded electronic commerce. "There are approximately 30 to 40 million active Internet users and 5.9 million host computers connected to the global Internet" (Garcia, 1995, p.12).

Statement of Purpose

The purpose of this study is to investigate the use of computer-mediated communication (CMC), specifically e-mail, and its affect on the flow of information in an organization. There are two reasons an in-depth examination seemed appropriate. First, there is little understanding of the effects that CMC has within organizations on the flow of information among networks. In traditional organizations, information usually flowed downward in the form of memos, correspondence, meetings, etc. Upward flow was usually filtered by the traditional "gatekeeper" role which may have inhibited transmission and reception.

Today, CMC can bypass most restrictions and/or inhibitors. The lack of face-to-face communication may also limit concerns of race, gender, age, status, or competence level, opening organizations to a more free flow of communication and information dissemination without regard to hierarchical structure or "protocol."

Second, several research studies over the last decade indicate that although e-mail is considered quicker and more cost efficient, organizations are having difficulties managing or monitoring both formal and informal communication networks influenced by CMC. Because e-mail can carry both formal and informal messages, it is hard to measure the influence the two networks have upon one another.

There is currently a change in the communication pattern and environment of organizations with CMC. Because of the decrease in the use of social cues, CM organizations experience much more electronic free talk (Kiesler, Siegel & McGuire, 1984). Thus, organizations are forced to re-examine their structure, communication channels, training procedures, management styles, and future technological advances. Managers are facing new concerns of how to effectively manage this freedom of electronic communication and are being forced to deal with a somewhat abandoned or ignored

hierarchical structure that traditionally dictated the flow of information within organizations. Now it is left up to senders and receivers to deem what information is appropriate to disseminate electronically and who should receive the information.

Therefore, examining data on the uses of e-mail and how this technology may affect the flow of information hierarchically could provide a better understanding of how organizations can manage this open access to information and freedom of communication more effectively. A log instrument and questionnaire has been specifically designed for this study to collect data regarding e-mail use in an academic organization and will address the following research questions:

RQ 1. Is there a difference in number of messages received and sent between the sender's status and/or gender relative to the receiver's?

RQ 2: Is there a difference in the attention a message is given based on the sender's status or the subject matter (type) of the message?

RQ 3: Are there differences in proportions of internal e-mail messages received by users from superiors, peers, and subordinates?

RQ 4: In general, do participants who use e-mail feel that this technology inhibits or enhances communication? Is there a difference between hierarchical levels?

CHAPTER 2

Methodology

The purpose of this study is to examine how e-mail may influence or inhibit the flow of information hierarchically throughout an organization and how users feel about e-mail. Hopefully, this study will shed some light on the effects that computer-mediated communication has on communication in organizations today when the traditional hierarchies and informal/formal networks are changing with technology.

Pretest

In order to examine the influence that computer-mediated communication, specifically e-mail, has on the flow of information within an academic organization's hierarchy, a two-part study has been designed. First, two log instruments (incoming messages and outgoing messages) were developed and then pretested. Second, a general questionnaire was constructed to provide a more in-depth examination. The log instrument pretest was done by four selected faculty members (two tenured professors and two untenured) within a midwestern urban university. Each participant logged his or her incoming and outgoing e-mail messages according to the categories and responses requested (see Appendix A for pre-test logs and instructions). Each participant was assigned a confidential code to indicate his or her own data. This pretest was done for one week. The data were analyzed to determine frequencies for each question and/or category. Based on this pretest, several changes were made to the logs.

Pretest Results and Instrumentation Design

Only the initial log instruments were pretested. Limitations of the pretest results included: 1) One individual who would not participate because of concerns of privacy, fear of a lack of confidentiality, recourse taken by those who might find out participant's

data, etc. 2) One participant dropped out very early in the study because of the time-consuming nature of the original incoming log designed and used in the pretest. This individual also received an abundant amount of e-mail messages per day that was unmanageable for the purposes of this pretest. 3) Two individuals indicated in advance that they experience repeat messages regularly and that this might distort the results of the pretest. 4) One individual attempted to be as honest and sincere as possible but found ambiguity as to where certain responses should go due to the nature of the provided response choice. 5) The researcher was also concerned with the overall honesty and directness of the participants' responses. 6) Certain language used like "personal or business" was found to possibly distort the true nature of the question because of the stigma associated with the word "personal." 7) The appropriateness of selecting e-mail for the message was overwhelmingly accepted. Therefore, explanation and/or alternative channel suggestions were not necessary.

Changes made to the logs based on these limitations were: 1) The privacy issue was addressed by assigning confidential numerical codes for each participant to enter on each log page. These codes were known only to the researcher and were not considered during the analysis of the results. 2) To address the complexity of the initial logs and the time constraint, the logs were both designed very similarly in order that the participants could simply enter an "X" in the appropriate response category for both logs. This eliminated any need for explanation or extensive time allotment. 3) New categories were created to address the limitation of repeat messages which were usually due to internal or external list serves. The category was also broken down to indicate if the message was sent to the receiver only, multiple receivers, or part of a list serve. 4) Ambiguity as to the appropriate and honest response to indicate was made clearer by language change and the addition of the "not applicable" category under status. 5) The simplicity and consistency

of the logs as well as the language change were anticipated to reduce limitations of honesty and directness in responses. 6) To reduce the stigma placed on "personal", the language was changed from "personal" or "business" to "professional" or "nonprofessional."

7) Because e-mail was found to be the appropriate channel used for 97% of the messages, the category was simplified for a yes or no answer.

The changes were implemented and revised logs were created to be used in the study (see Appendix B). Participants marked an "X" in the appropriate box for each category on the "Outgoing Messages" log when sending e-mail and on the "Incoming Messages" log when receiving e-mail. Written instructions accompanied the instruments at the beginning of the study (see Appendix B). Keys were created as well at the top of each log instrument for further clarification and understanding.

Log Issues:

1. If the message is coming from inside the organization, what is the hierarchical level of the sender? Is it most often from a peer?
2. How often are messages received and/or transmitted per day?
3. If the message is coming from outside the organization, is it professional or nonprofessional?
4. Was the message self-initiated or a response?
5. Was the entire message read or only scanned?
6. Was the message received considered appropriate by the receiver, i.e. useful, appropriately sent to the right person, important content, positive relationship between sender and receiver if sender is known (pretest only), e-mail was the appropriate mode for the message, or other reasons?
5. If the message received was not appropriate, why? (Pretest Only)

Second, the follow-up questionnaire was designed to aid the researcher in determining more detailed information regarding the participant's use of e-mail as it pertains to the study's research questions. A comparison between participant status levels was done to explore and determine relationships. Seventeen Likert-type items offered statements on which respondents were asked to indicate one of five levels of agreement (from strongly agree to strongly disagree). The final question, 18, was open-ended. Specifically, it was intended to measure feelings and thoughts about communicating through e-mail within the organization. A copy of the questionnaire can be found in Appendix C.

Questionnaire Issues:

1. Is e-mail easier and faster to use when disseminating or accessing information than memos, meetings, phone calls, faxes, or letters?
2. Do you perceive e-mail to enhance or inhibit communication to supervisors, subordinates, peers?
3. Is it easier to communicate certain messages via e-mail that you may not feel comfortable communicating face-to-face, by phone, by fax, or by U.S. mail, etc.

Subjects and Setting

The log instruments and questionnaire designed were hand delivered to a convenience sample of twelve individuals, two each (one male, one female) at five levels (university administration, college administration, department administration, full-time tenure track faculty, and full-time nontenure track faculty) and two females at the sixth level of university hierarchy (full-time support personnel). Before the study began, the researcher received an exemption from the University of Nebraska Institutional Review Board (IRB) for the use of human subjects in a study (see Appendix D). The participants

were specifically chosen based on e-mail use and availability for the study. The self-administered questionnaire was given to participants at the conclusion of the log instrument study period which was one week. Analysis of the logs and questionnaires began immediately. Data was coded and statistical tests were performed on a computer system using the SPSS-X statistical package.

Study Design

The dependent variable for the statistical tests in this study was e-mail usage. The independent variables were those variables influencing the flow of information hierarchically within an organization, i.e. user status, sender/receiver status, gender, whether it was sent to an individual or multiple, if the message sent was self-initiated or a response, if e-mail was the appropriate channel used, type of message, origination and destination (inside or outside the organization), and the attention paid to the message (was it read "entirely" or just "scanned," or "not read" at all). Data from the logs were used to answer the first three research questions; data from the logs and questionnaires were used to answer the fourth research question.

Examination of the available literature on the subject of e-mail and communication networks in organizations revealed that this new area of study has caused many concerns. Managers are concerned about e-mail's effectiveness and usefulness. They are also concerned whether or not it can be effectively managed in corporations today, especially, organizations that have traditional hierarchical structures that control the flow of information through networks. Results from this study hopefully provide a partial answer to the question, can the traditional communication network co-exist with the contemporary (computer) communication network? Research suggests that this new technology may bypass traditional forms of communication, i.e. face-to-face, telephone, etc., and could have profound effects on the way we communicate with one another.

CHAPTER 3

RESULTS

General Results

Study participants included 12 individuals, 7 females and 5 males ($N = 12$). These individuals were divided into 6 different hierarchical levels: (1) university administration (1 male, 1 female); (2) college administration (1 male, 1 female); (3) department administration (1 male, 1 female); (4) full-time tenure track faculty (1 male, 1 female); (5) full-time nontenure track faculty (1 male, 1 female); and (6) full-time support staff (2 females). The total number of e-mail messages collected from the log instruments were 984 which consisted of 756 incoming and 228 outgoing messages; incoming were logged from February 21 to March 2, 1997 and outgoing were logged from February 24 to March 2, 1997. Of the incoming messages, the majority, 203 messages (26.8%), were received on Tuesday, February 25, 1997. Of the outgoing messages, the largest number, 57 messages (25%), were sent on February 25, 1997. The follow-up questionnaire was answered and returned by all 12 participants. The participant's descriptive data as per the incoming and outgoing log frequencies are presented in Tables I and II. All of the statistical analyses were based on the data presented in Tables I and II.

RQ 1: Is there a difference in the number of messages received and sent between the sender's status and/or gender relative to the receiver's?

Participant and Sender Group Status (Incoming Messages)

Chi-square analysis of incoming message data revealed significant differences in the participant status and the sender's status as shown in Table III.

Table I: Participant Descriptive Data of Incoming Messages

Level	Freq.	Sender's status				Sender's Gender		
		<i>Sup.</i>	<i>Peer</i>	<i>Sub.</i>	<i>N/A</i>	<i>Male</i>	<i>Female</i>	<i>Unknown</i>
U. Admin.	145	10	18	27	90	55	69	19
C. Admin.	211	3	33	92	82	92	101	17
D. Admin.	129	3	36	33	56	65	48	15
T-Faculty	120	4	88	5	23	50	63	6
N-Faculty	86	11	21	5	49	34	49	3
Staff	67	24	2	3	38	21	42	4

Level	Type		Sent to?			Origin		Read Message			Appropriate	
	<i>Pro.</i>	<i>Non</i>	<i>Self</i>	<i>Mult</i>	<i>List</i>	<i>In</i>	<i>Out</i>	<i>Entire</i>	<i>Scan</i>	<i>No</i>	<i>Yes</i>	<i>No</i>
U. Admin.	134	11	32	25	88	114	29	77	68		129	15
C. Admin.	183	24	90	62	55	163	45	165	35	9	192	15
D. Admin.	119	10	20	43	66	99	30	62	40	26	129	
T-Faculty	117	3	11	28	80	79	40	100	19		118	1
N-Faculty	69	17	11	2	73	75	10	33	42	10	75	7
Staff	48	19	10	3	54	62	5	41	24	1	67	

Table II: Participant Descriptive Data of Outgoing Messages

Level	Freq.	Recipients's status				Recipient's Gender		
		<i>Sup.</i>	<i>Peer</i>	<i>Sub.</i>	<i>N/A</i>	<i>Male</i>	<i>Female</i>	<i>Unknown</i>
U Admin.	71	12	14	28	19	35	34	1
C. Admin.	113	7	41	60	5	43	62	4
D. Admin.	21		8	11	2	10	1	
T-Faculty	8		5		3	5	2	1
N-Faculty	8		1		7	4	4	
Staff	7	1			6	3	4	

Level	Type		Destination		Initiation	
	<i>Pro.</i>	<i>Non</i>	<i>In</i>	<i>Out</i>	<i>Self</i>	<i>Response</i>
U. Admin.	66	3	66	4	29	41
C. Admin.	97	16	103	10	72	41
D. Admin.	19	2	17	4	13	8
T-Faculty	7	1	4	4	1	7
N-Faculty		8	1	7	6	4
Staff	6	1	6	1	5	2

Table III: Participant and Sender Group Status--Incoming Messages

	Sender's Status				Total
	Superior	Peer	Subordinate	N/A	
Participant status					
University Admin.	10	18	27	90	145
College Admin.	3	33	92	82	210
Dept. Admin.	3	36	33	56	128
Full-time Tenure	4	88	5	23	120
Full-time Nontenure	11	21	5	49	86
Full-time Support	24	2	3	38	67
Total	55	198	165	338	756
Chi-square= 279.34	df= 10	p<.001			

Follow-up chi-square analyses on the participant group status by sender group status of incoming messages revealed significant differences within and between all levels of participants and senders. The general trend that emerged was that as the receiver's status level decreased, the sender's status level (when it could be identified) increased. In terms of identified incoming messages, the dominant status of senders for each level of receiver was: university administration, 49.1% subordinate; college administration, 71.9% subordinate; departmental administration, 50% peer and 45.8% subordinate; full-time tenure faculty, 90.7% peer; full-time nontenure faculty, 56.8% peer; and for full-time support staff, 82.8% superior.

In terms of incoming messages in which the sender's status could not be identified, university administration received the largest percentage amount (62.1%), followed by full-time nontenure faculty (57.0%), full-time support staff (56.7%), department administration (43.8%), college administration (39.0%), and finally full-time tenure faculty (19.2%).

Among the many specific differences discovered in the follow-up chi-square analyses were the following. University administrators received more messages in which the sender's status could not be identified than another other group. College administrators received more messages from subordinates than any other group. College and department administrators received fewer messages from superiors than any other groups. Full-time tenure track faculty received more messages from peers and fewer messages in which the sender's status could not be identified than any other group. Full-time support staff received more messages from superiors and less from peers and subordinates than any other group. Regarding sender status, more messages were sent from senders whose status could not be identified than from superiors, peers, or subordinates, and fewer messages were sent from superiors than from peers or subordinates.

Participant and Sender Group Gender (Incoming Messages)

Chi-square analysis of the incoming message data revealed a significant difference between females and males and the number of incoming messages received. The major difference was that females received significantly more messages from females than did males as shown in Table IV.

Table IV: Participant and Sender Group Gender—Incoming messages

	Sender's Gender		
	Male	Female	Total
Participant Gender			
Female	172	243	415
Male	145	129	274
Total	317	372	689
(Category "Unknown" excluded) Missing data = 69			
Chi-Square= 8.75	df= 1	p<.01	

Participant and Recipient Group Status (Outgoing Messages)

Chi-square analysis of the participant and recipient group status based on outgoing messages revealed significant differences between the participant's status and the recipient's status as shown in Table V.

Table V: Participant and Recipient Group Status—Outgoing Messages

	Recipient's Status				Total
	Superior	Peer	Subordinate	N/A	
Participant status					
University Admin.	12	14	26	19	71
College Admin.	7	41	60	5	113
Dept. Admin.		8	11	2	21
Full-time Tenure		5		3	8
Full-time Nontenure		1		7	8
Full-time Support	1			6	7
Total	20	69	97	42	228
Chi-Square= 31.70	df= 10		p<.001		

Follow-up chi-square analyses of the participant group status by recipient group status of outgoing messages revealed significant differences within and between all levels of participants and recipients. The major finding in terms of outgoing messages was that administrators sent 89.9% of all the outgoing messages (university administrators 31.1%, college administrators 49.6%, and department administrators 9.2%). Department administrators, full-time tenure faculty, and full-time nontenure faculty did not send any messages to superiors, and full-time support only sent one message to a superior during the log period. Full-time tenure faculty, full-time nontenure faculty and full-time support staff did not send any messages to subordinates during the log period.

Among the many specific differences discovered in the follow-up chi-square analyses were the following. University and college administrators sent 19 of the 20 reported messages to superiors, and they did not differ significantly from one another in sending messages to superiors. University, college, and department administrators differed from all other sender statuses in that they were the only participants to send messages to subordinates, but were not significantly different from one another in this type of message activity. University administrators sent more messages to receivers whose status could not be identified than any other group. While college administrators sent a larger actual number of messages to peers and subordinates than any other group, the only statistically significant difference found in messages sent to peers and subordinates was that full-time tenure faculty sent more messages to peers than any other group.

Participant and Receiver Group Gender (Outgoing Messages)

Chi-square analysis of the outgoing message data revealed no significant difference between the participant's gender and the receiver's gender as shown in Table VI.

Table VI: Participant and Recipient Group Gender—Outgoing Messages

	Recipient's Gender		
	Male	Female	Total
Participant Gender			
Female	76	91	167
Male	24	25	49
Total	100	116	216

(Category "Unknown" excluded) Missing data = 12
Chi-Square= .18 df= 1 p=.67

RQ 2: Is there a difference in the attention a message is given based on the sender's status or the subject matter (type) of the message?

Attention Given an Incoming Message (Sender Status)

Chi-square analysis of the incoming message data revealed a significant difference in the attention the participant gave to the message (read the entire message, scanned it, or didn't read it at all) based on the status of the sender as shown in Table VII.

Of the incoming messages, 63.4% were entirely read, 30.3% were scanned, and 6.3% were not read by participants. For each classification of sender status, the percentage of messages that were entirely read, scanned and not read was respectively: superior--81.8%, 18.1% and 0%; peer--79.6%, 15.2% and 5.0%; subordinate--76.9%, 15.7% and 7.2%; and N/A--44.1%, 48.3% and 7.4%.

Table VII: Attention Given to Incoming Messages Based on Sender's Status

	Sender's Status				Total
	Superior	Peer	Subordinate	N/A	
Read the message?					
Entire	45	157	127	148	477
Scan	10	30	26	162	228
No		10	12	25	47
Total	55	197	165	335	752
Chi-square= 105.39	df= 6	p<.001			

Follow-up chi-square analyses of the incoming message variable, "Did you read the message" (entire, scan, no) by sender's status revealed differences within and between the hierarchical levels of the senders and whether their messages were "read," "scanned," or "not read."

Among the differences discovered in the follow-up chi-square analyses were the following. More messages were entirely read from superiors, peers and subordinates than from N/A. Messages from N/A were scanned more often than from any other group.

In terms of messages not read, none were sent by superiors. No differences were found in messages not read between peer, subordinate, and N/A.

Attention Given an Incoming Message (Type of Message)

Chi-square analysis of the incoming message data revealed no significant difference on the attention a participant gave a message based on the type of message it was as shown in Table VIII.

Table VIII: Attention Given to Incoming Messages Based on Type of Message

	Type of Message		
	Professional	Nonprofessional	Total
Read the message?			
Entire	427	48	475
Scan	198	30	228
No	42	5	47
Total	667	83	750
Chi-square= 1.47	df= 2	p=.48	
Missing data = 8			

RQ 3: Are there differences in proportions of *internal* e-mail messages received by users from superiors, peers, and subordinates?

Participant and Sender Status (*Internal* Messages)

Chi-square analysis of the incoming message data revealed significant differences at the $p < .001$ level regarding *internal* incoming messages and sender status as shown in Table IX.

Table IX: Participant and Sender Status—Internal Messages

Part. Status	Sender's Status				Total
	Superior	Peer	Subordinate	N/A	
University Admin.	10	17	25	62	114
College Admin.	3	28	91	41	163
Dept. Admin.	3	31	32	32	98
Full-time Tenure	4	55	5	15	79
Full-time Nontenure	11	21	4	39	75
Support Staff	24	2	3	33	62
Total	55	154	160	222	591

Chi-square= 413.55 df= 30 $p < .001$

Follow-up chi-square analyses of the participant group status by sender group status of *internal* incoming messages revealed significant differences within and between all levels of participants and senders. These results were similar to the results for participant and sender group status for all incoming messages (see Table III), i.e. the general trend was that as the receiver's status level decreased, the sender's status level (when it could be identified) increased. With only two exceptions, the overwhelming number of incoming messages were internal. The first exception was incoming messages received by all levels of participant hierarchy from senders whose status could not be identified -- a number of these messages for all levels were not internal. The second exception was incoming messages received by full-time tenure faculty from peers -- 55 of the 88 total incoming messages in this category were internal.

RQ 4: In general, do participants who use e-mail feel that this technology inhibits or enhances communication? Is there a difference between hierarchical levels?

T-tests performed on the questionnaire data revealed no differences based on gender for **16 of the 17** questionnaire items (see Appendix E). Question 18 on the questionnaire will be reported qualitatively in the discussion section (n=8).

Questions 1 thru 4, and 5 were designed to obtain general descriptive data regarding e-mail messages. Questions 6, 8, 9, 11, and 13 thru 17 were intended to reveal feelings and/or opinions regarding e-mail. Questions 7, 10, and 12 were intended to possibly reveal cognitive data (what the participant thinks) based on the participant's e-mail use. The questionnaire data is further analyzed qualitatively in the discussion section.

The only significant difference at the $p < .05$ level was identified for participant **gender**: question 12, "The amount of time I spend reading a given e-mail message is based on if the information has merit and is appropriate to the job" (1=Strongly Agree, 5=Strongly Disagree). Male respondents all indicated that they strongly agreed and female respondents indicated that they agreed but to a lesser degree than males. Question 2, which read, "Most of the e-mail messages I receive are for business related issues" was strongly agreed to by all participants.

One-way ANOVAs performed on the questionnaire data revealed no differences based on participant level for **15 of the 17** questionnaire items (see Appendix E). The questionnaire data is further analyzed qualitatively in the discussion section.

There were two significant differences at the $p < .05$ level that were identified for participant **hierarchy** (see Table X): question 1, "The majority of e-mail messages I send within my organization travel horizontally (in terms of hierarchical level) to other peers," and question 5, "Of those messages deemed inappropriate, it is usually because the message content is not useful" (1=strongly agree and 5=strongly disagree) (see Table X).

Student Newman Kuels (SNK) Multiple Range follow-up tests were done for these ANOVAs on question 1 and 5 to identify the specific differences.

Table X: Questionnaire Items by Participant Level: Oneway ANOVA & SNK

Six Groups					
Source		df	MS	<i>F</i>	<i>p</i>
Q1	Between	5	3.48	5.97	.03
	Within	6	.58		
	Total	11			

SNK Procedures:

Subset 1

Groups	Group 4	Group 3	Group 2	Group 6
Means*	1.5	2.5	4.0	4.0

Subset 2

Groups	Group 3	Group 2	Group 6	Group 1	Group 5
Means*	2.5	4.0	4.0	4.5	5.0

Six Groups

Source		df	MS	<i>F</i>	<i>p</i>
Q5	Between	5	2.35	5.64	.03
	Within	6	.42		
	Total	11			

SNK Procedures:

Subset 1

Groups	Group 4	Group 2	Group 5	Group 6	Group 3
Means*	1.0	1.5	2.0	2.0	3.0

Subset 2

Groups	Group 5	Group 6	Group 3	Group 1
Means*	2.0	2.0	3.0	4.0

*Means for groups within a common subset do not differ significantly from one another ($p < .05$).

Key: Group 1 = University Administration
Group 3 = Department Administration
Group 5 = Nontenure-track Faculty

Group 2 = College Administration
Group 4 = Tenure-track Faculty
Group 6 = Support Staff

The SNK follow-up test for question 1 (see Table X) revealed differences in responses based on hierarchy between tenure-track faculty and university administration and nontenure track participants; the tenure track faculty strongly agreed with the statement that the majority of their sent e-mail messages traveled horizontally, university administration and nontenure track faculty strongly disagreed with this statement.

The SNK follow-up test on question 5 (see Table X) revealed significant differences in responses based on hierarchy between both tenure-track faculty and college administration and university administration; university administration more strongly disagreed with the statement that, of those messages deemed inappropriate, it is usually because the message content is not useful.

Other Results

The questionnaire revealed some interesting data regarding the responses to individuals items and what participants thought or felt about a particular question. Question 1 revealed a significant difference between hierarchy but not gender or degree of response. Question 4 was different between degree of response (83% said strongly agree) but not gender or hierarchy. Question 5 revealed a significant difference between hierarchy but not in gender or degree of response. Question 6 was significant in degree of response (75% said strongly agree) but not in gender or hierarchy. Question 12 revealed a significant difference between gender but not with hierarchy.

CHAPTER 4

Discussion

RQ1: Is there a difference in number of messages received and sent between the sender's status and/or gender relative to the receiver's?

The answer to this question is yes in terms of status and messages received and sent, and gender and messages received, but no in terms of gender and messages sent. Analyses of the participant's incoming and outgoing e-mail messages indicate that there are significant differences between the sender's status relative to the receivers and in messages received and sent as comparisons are made from top level hierarchy to bottom level.

Basic organizational communication theory indicates that, in the past, top level management usually did most communicating of their messages downward within the organization in the form of memos, letters, meetings, and phone calls (Conrad, 1995). Messages that traveled upward within an organization were rare and usually were in the form of formal letters, presentations, and/or memos only. Gatekeepers, usually secretaries or assistants, were responsible for monitoring and/or filtering messages to upper management. These gatekeepers virtually had control of what information would eventually be received by management (Conrad, 1995). However, recent literature regarding CMC within the organization suggests CMC impacts the traditional flow of information because of accessibility through the use of computers. Using e-mail, for example, an employee may be able to send a message upward within the organization virtually without any barriers inhibiting the transmission or reception of that message.

The results in this study, however, are contrary to recent conclusions regarding CMC's impact on the flow of information. Because there were very few participants

communicating upward to higher status levels and an abundance of messages traveling horizontally and downward, it seems that the assumption of e-mail providing more accessibility and freedom to communicate throughout the hierarchy is faulty. This study indicates that although the literature states that e-mail can possibly break down some of the hierarchical barriers that may inhibit message reception, rarely do the employees (in this academic institution) send messages upward. These findings are consistent with traditional organizational theory. An interesting note may be that the access is there but few attempt or choose to use it.

For incoming messages, results indicate when comparing sender's status (superior=55, peer=198, subordinate=165) (Table III) and gender (male=317, female=372) (Table IV) with participant's (receiver) status (univ. admin.=2, college admin.=2, dept. admin.=2, tenure=2, nontenure=2, support staff=2) and gender (male=5, female=7--two females at the support staff level) that differences exist, as expected, between hierarchical levels and the messages received from superiors, peers, subordinates, and those whose status could not be identified (N/A). The generalized trend was that as receiver's status decreased, the sender's status increased.

Among specific findings were the following. University administrators had the highest percentage of messages from senders whose status could not be identified (N/A). College administrators had the most messages from subordinates. College and department administrators had fewer messages from superiors. Full-time tenure faculty had more messages from peers and fewer from senders whose status could not be identified (N/A). Full-time support staff had more messages from superiors and fewer from peers and subordinates. Gender data revealed one major significant difference for incoming messages between males and females and the gender of message senders. Females received significantly more messages from females than did males (Table IV). When

comparing the received messages and whether they were sent to the individual participants, multiple people, or a list serve, there are very little differences between females and males.

For outgoing messages, results indicate some significant differences between status and the messages sent when comparing receiver's status (superior=20, peer=69, subordinate=97) (Tables V) and gender (male=100, female=116) (Tables VI) with participant's (sender) status (univ. admin.=2, college admin.=2, dept. admin.=2, tenure =2, nontenure=2, support staff=2) and gender (male=5, female=7--two females at the support staff level). There were more differences occurring when comparisons were made downward in the hierarchy. For example, university, college, and departmental administration had fewer differences when compared with one another than when compared with nontenure faculty and staff support (lower in the hierarchy). It also stands to reason that nontenure and staff would experience fewer differences when comparing among themselves but larger differences when comparing upward within the hierarchy.

Overall, in terms of gender and outgoing messages, no significant differences were found between females and males. However, there was a tendency for females to send more messages than their male counter-parts. This finding may support an assumption made by Y. S. Lincoln in her study of 'invisible colleges' applied to electronic communities (1992). Lincoln noted differences in her study which included four women, "E-mail seems to be providing women the abilities to network that have been only inadequately realized in traditional academic forums...women felt additional, and very powerful, senses of connectedness with e-mail" (In Held et al., 1994, p. 206).

Differences were expected between hierarchy and were expected to increase as comparisons were made downward within the hierarchy (from top levels to bottom levels). This finding follows closely with the media richness theory. In a 1984 study by Daft &

Lengel, senior managers use rich media (which reduce high levels of ambiguity) proportionately more than persons lower in the organizational hierarchy, because the managers' job involves greater ambiguity (in Schmitz & Fulk, 1991). Also, the majority of the managers in the same study reported that they would choose face-to-face for incidents high in ambiguity, but not for incidents low in ambiguity.

RQ2: Is there a difference in the attention a message is given based on the sender's status or the subject matter (type) of the message?

The answer to this question is yes in terms of the attention a message was given between when the sender's status was identified and when it was not identified, and no in terms of levels of identified status or in terms of subject matter of the message.

No significant differences were found in terms of whether or not participants read the entire message, scanned the message, or did not read the message compared to the sender status when it could be identified as superior, peer, or subordinate. Significant differences were found in that more of the messages were read entirely from superior, peer and subordinate than from those whose status could not be identified. The messages from senders whose status could not be identified were scanned more often. This may lend credence to the idea that messages are more often read when a name is attached. Often times, messages may be deleted, ignored, or given less priority because no name is attached, thus, giving the perception that the message is of less importance or meant to be of a more impersonal nature.

Among specific findings were the following. An interesting consistency between the questionnaire and the logs' analyses is that on question 13, which read, "I feel that I only scan the majority of messages I receive," 75% of the participants disagreed or strongly disagreed. This is consistent with the log data in that only 228 out of 752 (30%)

were scanned. Interestingly enough, statistics reveal that well over half of the e-mail messages received were read (477 out of 752). Also, regarding question 12, which read, "The amount of time I spend reading a given e-mail message is based on if the information has merit and is appropriate to the job" a difference (although nonsignificant) between means (females = 1.71) and (males = 1.00) is apparent. Females were closer to agree than strongly agree, and all males strongly agreed. Therefore, a possible assumption may be that females might place different priorities on reasons for how much time they spend reading messages. An important issue to consider here is that the message content may play a larger role than status in how much attention we give to each message. Whether or not the information has merit and is appropriate to the job may have a direct connection to content.

The variables "read the message" by "type of message" (Table VIII) were not significant and indicated that 94% of the professional (n=670) and nonprofessional (n=84) messages were either read or scanned.

RQ 3: Are there differences in proportions of internal e-mail messages received by participants from superiors, peers, subordinates?

The answer to this question is yes. The majority (78.2%) of messages received by participants were internal (coming from people within the organization). Chi-square analyses revealed that there were significant differences in the amounts of internal messages (n=591) received by each participant category as compared with sender's status (Table IX). The results of the analyses for internal messages were very similar to the results obtained when all messages were analyzed (RQ 1). The general trend was that as receiver's status decreased, the sender's status increased.

Two noteworthy differences between the analyses of all messages received and internal messages received were the following. First, while 44.7% (338 of 756) of all received messages were listed as sender's status could not be identified, only 37.6% (222 of 591) of internal received messages were so listed. Second, 33 of 88 messages received by full-time tenure faculty from peers were not listed as being internal. Thus, full-time tenure faculty received from external peers more than twice the number of messages (33 versus 16) than all other participant/external sender combinations where the status of the sender could be identified. This result indicates that full-time tenure faculty are communicating by e-mail with colleagues outside the university more than any other participant group.

RQ 4: In general, do participants who use e-mail feel that this technology inhibits or enhances communication? Is there a difference between hierarchical levels?

A general answer to this question is that e-mail is perceived as enhancing communication. A percentage tabulation of the Likert scale responses (1= strongly agree, 2= agree, 3= neutral, 4= disagree, 5= strongly disagree) for each question revealed the following information regarding questionnaire data (see Table XI in Appendix E). Questions 6 (100%), 8 (83%), 9 (50%), 11 (42%), 14 (83%), 15 (67%), 16 (50%) and 17 (92%) revealed in a general sense that respondents feel (strongly agree and agree) e-mail enhances communication. However, 8% of respondents strongly agree, 33% agree, 42% disagree, and 17% strongly disagree with the statement regarding whether they feel they can openly and honestly communicate their ideas and feelings across hierarchical boundaries (Q11). The t-test performed on the individual questions by gender revealed no statistical difference between genders regarding feelings about communicating across hierarchical boundaries (see Table XI in Appendix E).

Questions 1 thru 4, and 5 were aimed at general opinions of participants regarding e-mail messages. Of these, questions 2 and 4 found that the majority of participants strongly agree that most of the messages received are for business related issues and are appropriate (Q2, 100%; Q4, 83%). The one-way ANOVA performed on the individual questions by hierarchical level revealed two significant differences at the $p < .05$ level for Q1 and Q5 (Table X). Question 1 differences were found between whether the majority of their messages traveled horizontally to other peers. The participants' questionnaire data were consistent with the log data in that the majority of respondents indicated their outgoing messages were not to peers but to subordinates and N/A. A Student Newman Kuels test for question 1 (see Table X) based on hierarchy found the differences regarding whether participants thought the majority of the messages they send to be to peers between the tenure track faculty level and the university administration and nontenure track faculty levels. Participants within the tenure track faculty level more strongly agreed that the majority of their messages would travel to peers than university administration and nontenure track faculty who more strongly disagreed. According to the SNK for question 5 (see Table X), differences were found regarding the messages participants deem inappropriate because of the message content not being useful between the university administration level and the tenure track faculty and college administration levels. Participants at the university administration level disagreed that inappropriate messages were usually because of the content not being useful and tenure track and college administration more strongly agreed with the statement.

Questions 6, 8, 9, 11, and 13 thru 17 were attempting to reveal participant's feelings and/or opinions regarding e-mail. However, no differences between participant's gender and/or hierarchical level were found (see Table XI in Appendix E). Question 6, which read, "I feel that e-mail is useful and enhances communication and productivity"

was strongly agreed upon by 75% of respondents. However, as mentioned above in question 11, 42% ranged from SA to A and 59% ranged from D to SD regarding their feelings about whether they can openly and honestly communicate their ideas and feelings regardless of the intended receiver's hierarchical status. This data may reveal that e-mail does not facilitate open and honest communication without regard to hierarchical status. A traditional flow of information within the hierarchy still exists possibly because traditional organizational barriers that accompany top-down communication are not being violated. Participants may feel limited as to what can be communicated and to whom regardless of the channel used.

Question 8, which read, "I feel that the amount of time used to send and retrieve messages is productive and beneficial" indicated that 33% of respondents strongly agreed and 50% agreed. Question 9, which read, "I feel that e-mail is a more appropriate way to send and receive information than memos, meetings, phone calls, faxes, or letters" revealed that participants varied (25%-SA, 25%-A, 25%-N, 17%-D, and 8%-SD) in their responses from strongly agree through strongly disagree. Questions 14 and 15 responses indicated that participants feel (Q14 58%-SA, Q15 42%-SA) that e-mail is a more cost-efficient way to receive information from and disseminate out of the organization than written memos. Question 16 responses indicated that more participants (33%) answered neutral with 50% answering strongly agree to agree (25%-A and 25%-SA) to whether they felt that e-mail is an easier way to communicate some messages than memos, meetings, phone calls, or letters. However, question 17 data revealed that 92% (50%-SA and 42%-A) felt that e-mail is a faster way to send and receive information than the alternatives mentioned above. However, no differences between gender or hierarchical level were found.

Questions 7, 10, and 12 were aimed toward retrieving cognitive data (what the participant thinks) based on the participant's e-mail use. Question 7 data revealed that all participants felt (67%-SA and 33%-A) that their supervisors would feel that e-mail enhances communication and productivity. This feeling may support the tremendous growth experienced within organizations when communicating via e-mail. No hierarchical level or gender differences were found for these questions except with regards to question 12. Question 12 revealed a significant difference between genders at $p=.05$ level that females may not base the time they spend reading e-mail messages on "...if the information has merit and is appropriate to the job." The data may indicate that for females, other issues take priority when determining the amount of time spent on reading their e-mail messages.

In comparison with the questionnaire responses regarding whether participants thought that they self-initiate messages as much as they respond (Q3), the majority of participants disagreed (33%) or strongly disagreed (42%). However, there is not a significant difference between self-initiated messages and responses indicated by the actual logged messages. Excluding the support staff category because they were both females, a direct comparison of female and male participants in the five levels revealed that females self-initiated 57% of their messages, 43% responses and males self-initiated 49% of their messages, and 51% of their responses.

Question 18 on the questionnaire, "Are there any other issues that are not addressed in the above questionnaire that you would like to express regarding e-mail and organizational communication" was an open-ended question. Of the 12 respondents to the questionnaire, 8 answered the open-ended question. Responses involve: (1) E-mail can improve connections between people. However, overuse should be avoided because personal contacts should be preferred. (2) Duplicate messages and replies to messages

sent to everyone but are only intended for the original sender of the messages are issues of concern. (3) Nonprofessional e-mail messages (not pertaining to work related issues) decrease production. If e-mail is intended to be a mass communication at the university, then everyone must have access to it. Communication intended for the mass public should be communicated via e-mail only in order to prevent the wasting of paper. (4) Messages not directed toward an individual receiver wastes productive time. (5) E-mail is appropriate for informational messages but not for sensitive messages.

CHAPTER 5

Conclusion

The primary goal of this thesis was to identify differences in e-mail use by selected employees of a midwestern urban university of both genders at six levels of hierarchy. This study was exploratory in nature in order to gather information regarding e-mail and its uses within an academic organization and opinions and thoughts participants had regarding e-mail. Although the researcher's initial expectations were mostly supported, some interesting results were revealed.

An overall conclusion of this study is that although e-mail has been said to possibly breakdown hierarchical boundaries, this study revealed more support for the opposite. Analyses of the data found no evidence that e-mail has had an impact on the traditional flow of information throughout the organizational hierarchy. Although e-mail may violate some of the traditional barriers to communication, this study shows that individuals are not altering from the classic chain-of-command. Another interesting finding is that although e-mail may be considered easier and/or faster in communicating throughout the organization, employees do not feel that they can communicate openly and honestly via e-mail without regard to hierarchical status of the receiver. Traditional theory indicates that the typical flow of information, top to bottom, and the respect for status within organizations is still supported. Although some participants communicated in uncommon directions, the majority of participants were very traditional in their communication patterns. Therefore, within this study, e-mail has not had the impact suggested by available literature but its effects are in accord with traditional organizational theory.

This thesis also sought to find differences in how participants use e-mail and its effects on the organizational environment. However, the findings do not suggest effects but suggest the lack of impact that e-mail has on hierarchical status barriers. Issues to be

further examined for possible effects of e-mail may be the effect on the individual in how, when, and why they use e-mail. Almost daily, organizations and individuals are experiencing conflicts and successes with communicating via technology. This study of e-mail is just one examination of the way that academic organizational members send and receive information. Attitudes regarding e-mail may vary throughout types of organizations and the purposes for using e-mail. Therefore, only by studying e-mail in different environments can we develop an understanding and desire for more effective and efficient ways of communicating.

Limitations

Because this was an exploratory study, there are several limitations that must be addressed. First, the sample size ($n=12$) was very small and may not be generalizable to the organization. The sample selection pertained to academia only and may not be generalizable across academic organizations or across other types of organizations. Also, the interesting gender differences found require further research in order to clearly understand why the differences exist and whether these differences can be found across status levels, professions and/or organizations.

Because of the rigorous data collection method of this study (logging all incoming and outgoing messages and corresponding variables for one week), the data collected may not reveal the true numbers of messages received/sent by participants. Also, the data collected may be influenced by the e-mail activity levels of the participants depending on intervening variables not accounted for or considered, i.e. participants and receivers/senders may be out of town, an unusually low or high amount of incoming or outgoing messages, a large amount of messages sent or received by any one individual, the participant's apprehension to reveal certain types of messages, privacy issues, policies and expectations regarding e-mail use, the official functions of the participant that may

influence the message type and appropriateness of communicating these messages via e-mail, etc. Also, the coding by participants of their perceptions of the hierarchical status of those to receive or those who sent the message may be quite subjective if ambiguous. Hierarchical status levels, as they relate to the participant, may not be as black or white as expected but may be perceived differently ("is she/he my superior, peer, subordinate, or is a status level not applicable to this person?"). This area would benefit from further qualitative research (e.g. indepth interviews) that would add more detail and richness to those limitations regarding subjectivity.

Another issue related to coding is the nature of the message itself. The perception of the kind of message that has been communicated may also vary across participants, i.e. whether the message was business related or personal, and whether the participant's perception of the message's appropriateness depended on the content of the message, the sender, or the channel. Message content may play a larger role in determining one's perception of a message and should be examined more closely.

Another limiting factor of this study is the variables/issues not considered. For example, incoming messages may be from a list serve and could therefore be categorized as multiple genders for multiple senders, and the gender of a sender may be mislabeled when the participant was unsure. Also, it does not account for information that participants may have forwarded themselves via the Internet, Web pages or other sources that would appear on their incoming e-mail message screen.

Another limitation exists regarding the number of incoming and outgoing messages by participants. Because of the official functions and various additional roles that each of the study participants might hold, the number of messages, the appropriateness of the communication and channel, and message types may vary and/or be different during the study period than other weeks of the academic year.

A final limitation of the study is the lack of qualitative data to support the abundant quantitative data collected. An appropriate addition to this study, possibly for future research, may be the collection of in-depth, follow-up interviews to provide rich, detailed description of the participant's feelings, situations, experiences, and thoughts that occurred during the study.

Implications

In attempting to examine a selected group of participants within an academic environment, it is hopeful that this small study may lend itself to much larger studies in the area of computer-mediated communication. If nothing else, this study raised many of the concerns, conflicts, and issues regarding CMC indicating that the available research has but only scratched the surface. By attempting to gather, however small, information on patterns and variables to consider within e-mail and communication, researchers may eventually reveal more conclusive evidence as to CMC affects, successes and failures. Also, in discovering the possible differences between perceptions of public and private communication may add to our understanding of how individuals choose a channel for public and private messages and what dictates whether messages are considered appropriate to communicate via e-mail and/or other channels.

Because managers and supervisors are possibly experiencing difficulty managing the use of e-mail, it is necessary to create an understanding of the most effective and productive ways it can be used. This may also indicate a need for society to increase its understanding of CMC within the organizational context. E-mail can be used to increase and not decrease production as many may think. Research into this field will only enhance society's profound need to understand and control technological phenomena that are rapidly spiraling out of control.

Recommendations for Future Research

Because of the limited amount of study in this area, future research could improve our understanding of communicating via technology. As a result of rapidly growing hardware and software capabilities, newer and better electronic mail programs are developing to facilitate quicker, easier, and more effective means of CMC. Research indicates many concerns and conflicts that arise when communication is mediated via technology. By designing studies that establish e-mail communication patterns, researchers may learn just how communication is affected. Another important factor to consider is the purpose for which individuals use e-mail within the organization. Although e-mail may limit personal and/or face-to-face contact, organizations might benefit when information can be sent and received with fewer restrictions and boundaries. Information will be more accessible and quicker to decipher in a world that operates by deadlines and competition. The message content may be seen as an intervening variable affecting communication and should be considered further.

As we follow the evolutionary patterns of e-mail as a communication tool, we may find that it is very cultured. As it becomes more universal, perceptions change and individuals may find themselves communicating differently and suspending normal communication patterns. Many channels for communication start out being used because of their informal nature. However, as seen with other mediums, e-mail may be beginning to take on more formality. Through restrictions, rules and/or policies, one must wonder if the same conventions of hard copy communication are being applied to e-mail as it matures. E-mail's evolutionary pattern is in need of further consistent study in order to track our treatment of such communication media and in turn, its influence on us.

Much more research is needed in the area of e-mail's effect on interpersonal communication. Currently, there are disagreements within the research community

regarding whether or not CMC impacts or alters a human's need for interpersonal contact. Many believe that this is not the organization's concern. However, users of technology may need to stop and consider whether individuals can communicate without face-to-face contact for extended periods of time and still feel connected and needed within the organization. One would wonder then if productivity may be affected. From an organizational standpoint, more efficient communication is better and facilitates better production. However, research has yet to discover whether more efficient communication via technology does enhance productivity when managers are having a difficult time managing this new found freedom to receive and send information.

One concern when examining e-mail's effect and use within an organization is that all organizations differ in environments, individuals, goals, and product. Therefore, what works for one organization may not work in another. Unfortunately, this may only be discovered through trial and error. Through further research, organizations may at least find easier and better ways of managing and facilitating the use of CMC that is conducive to each individual environment and leads to more production and more satisfied employees.

In an area of communication that is increasingly becoming dominated by technology, CMC is a relatively new area of study. While managers and employees are searching for more efficient and effective means of communication, they may need to look no further than their computers. Although the nature of this study does not lend itself to revealing conclusive judgments or generalizations about e-mail, it is but one step closer to understanding yet another vehicle that facilitates organizational, interpersonal, and international communication. Future research focusing on qualitative data collection methods may provide this study with more detail and in-depth understanding of the questions left unanswered.

References

- Alavi, M. (1994). Computer-mediated collaborative learning: An empirical evaluation. *MIS Quarterly*, 18 (2), 159-173.
- Albrecht, T. L. & Hall, B. J. (1991). Facilitating talk about new ideas: The role of personal relationships in organizational innovation. *Communication Monographs*, 58, 273-288.
- Allen, B. J. (1995). Gender and computer-mediated communication. *Sex Roles*, 32 (7/8), 557-563.
- Arunachalam, V. & Dilla, W. N. (1995). Judgment accuracy and outcomes in negotiation: A causal modeling analysis of decision-aiding effects. *Organizational Behavior*, 61 (3), 289-304.
- Bajjalay, S. T. (1995). Welcome to the MidNet. *Business & Economic Review*, 41 (3), 32-34.
- Barnes, S. & Greller, L. M. (1994). Computer-mediated communication in the organization. *Communication Education*, 43 (2), 1-12.
- Benson, T. W. (1994). Electronic-network resources for communication scholars. *Communication Education*, 43 (2), 1-10.
- Berleant, D. & Liu, B. (1995). Robert's Rules of Order for e-mail meetings. *Computer*, 28 (11), 84-85.
- Burns, N. (1995). E-mail beyond. *PC Magazine*, 14 (8), 102-108.
- Cecez-Kecmanovic, D. (1994). Organizational activity support systems. *Decision Support Systems*, 12, 365-379.
- Connell, S. & Galbraith, I. A. (1980). *Electronic Mail*. New York: Knowledge Industry.
- Conrad, C. (1990). *Strategic Organizational Communication*. Fort Worth: Dryden Press.
- Dunlop, C. & Kling, R. (Comps. and Eds.). (1991). *Computerization and Controversy: Value conflicts and social choices*. Boston: Academic Press.
- Farace, R. V., Monge, P. R., & Russell, H. M. (1977). *Communicating and Organizing*. Reading: Addison-Wesley.
- Forester, T. (1987). *High-Tech Society*. Cambridge: MIT Press.
- Garcia, D. L. (1995). Networking and the rise of electronic commerce: The challenge for public policy. *Business Economics*, 30 (4), 7-14.
- Glauser, M. J. (1984). Upward information flow in organizations: Review and conceptual analysis. *Human Relations*, 37 (8), 613-643.
- Goldhaber, G. M. & Barnett, G. A. (Comps. and Eds.). (1988). *Handbook of Organizational Communication*. Norwood: Ablex Publishing Co.
- Greengard, S. (1995). E-mail: Using your connections. *Personnel Journal*, 74 (9), 161-165.
- Gurak, L. J. (1995). Rhetorical dynamics of corporate communication in cyberspace:

- The protest over Lotus MarketPlace. *IEEE Transactions on Professional Communication*, 38 (1), 2-10.
- Horowitz, R. B. (1994). Improving managerial-employee communication: A case study. *Proc. 41st Annual Society for Technical Communication Conference*, Minneapolis, May 15-18.
- Horowitz, R. B. & Barchilon, M. G. (1994). Stylistic guidelines for e-mail. *IEEE Transactions on Professional Communication*, 37 (4), p. 207-212.
- Hunter, J. & Allen, M. (1992). Adaptation to electronic mail. *Journal of Applied Communication Research*, 20 (3), 1-16.
- Johnson, J. D. (1993). *Organizational Communication Structure*. Norwood: Ablex Publishing Co.
- Johnson, J. D., Donohue, W. A., Atkin, C. K., & Johnson, S. (1994). Differences between formal and informal communication channels. *The Journal of Business Communication*, 31 (2), 111-121.
- Lewis, L. K. (1991). Interactive communication technologies in organizations. *Communication Education*, 40 (2), 1-9.
- Malone, T. W. & Rockart, J. F. (1991). Computers, Networks, and the Corporation. Computer networks are forging new kinds of markets and new ways to manage organizations. The result will be a major change in corporate structure and management style. *Scientific American, [Special Issue]*, 128-136.
- Mantovani, G. (1994). Is computer-mediated communication intrinsically apt to enhance democracy in organizations? *Human Relations*, 47 (1), 45-61.
- McPhee, R. D. & Corman, S. R. (1995). An activity-based theory of communication networks in organizations, applied to the case of a local church. *Communication Monographs*, 62, 132-150.
- Olaniran, B. A. (1995). Perceived communication outcomes in computer-mediated communication: An analysis of three systems among new users. *Information Processing & Management*, 31 (4), 525-541.
- PreiBl, B. (1995). Strategic use of communication technology - diffusion processes in networks and environments. *Information Economics and Policy*, 7, 75-99.
- Qureshi, S. (1995). Meeting and working on an electronic social space: Behavioural considerations and implications for cross-cultural end user computing. *Journal of End User Computing*, 7 (4), 12-21.
- Rogers, E. M. with Svenning, L. (1969). *Modernization Among Peasants: The Impact of Communication*. New York: Holt, Rinehart and Winston, Inc.
- Rogers, E. M. & Solo, R. A. (Eds.). (1972). *Inducing technological change for economic growth and development*. Michigan State University Press.
- Sandholtz et al. (1991). The relationship between technological innovation and collegial interaction. Presented at the *Annual Meeting of the American Educational Research Association*, Chicago, April 3-7.

- Schmitz, J. & Fulk, J. (1991). Organizational colleagues, media richness, and electronic mail. A test of the social Influence model of technology use. *Communication Research*, 18 (4), 487-523.
- Spinuzzi, C. (1994). A different kind of forum: Rethinking Rhetorical Strategies for electronic text media. *IEEE Transactions on Professional Communication*, 37 (4), 213-217.
- Sproull, L. & Kiesler, S. (1991). *Connections*. Cambridge: MIT Press.
- Sproull, L. & Kiesler, S. (1991). Computers, Networks and Work. Electronic interactions differ significantly from face-to-face exchanges. As a result, computer networks will profoundly affect the structure of organizations and the conduct of work. *Scientific American*, [Special Issue], 116-123.
- Straus, S. G. & McGrath, J. E. (1994). Does the medium matter? The interaction of task type and technology on group performance and member reactions. *Journal of Applied Psychology*, 79 (1), 87-97.
- Tortoriello, T. R., Blatt, S. J., & DeWine, S. (1978). *Communication in the Organization*. New York: McGraw-Hill.
- Valacich, J. S. & Schwenk, C. (1995). Devil's advocacy and dialectical inquiry effects on face-to-face and computer-mediated group decision making. *Organizational Behavior and Human Decision Processes*, 63 (2), 158-173.
- Verespej, M. A. (1995). Communication technology: Slave or master? *Industry Week*, 244 (12), 48-55.
- Weisband, S. P., Schneider, S. K., & Connolly, T. (1995). Computer mediated communication and social information: Status salience and status differences. *Academy of Management Journal*, 4, 1124-1151.
- Wilkins, H. (1991). Computer talk: Long-distance conversation by computer. *Written Communication*, 6 (1), 56-78.
- Zack, M. H. (1994). Electronic messaging and communication effectiveness in an ongoing work group. *Information & Management*, 26, 231-241.

APPENDIX A

Instructions for E-mail Pre-Test

Outgoing Message Log

Please log each outgoing e-mail message that you send per day for one week (five days) beginning Monday, October 7, 1996. Place an "X" in the box below the three categories (Recipient Status, Destination and Initiation). Indicate one box per category and write in the date and time for each message sent. Indicate your participant ID number at the top of the form. Your results will be confidential.

Messages Received Log

Please log each e-mail message received per day individually. Each e-mail message should be logged on one entire sheet of paper, and you should answer all questions on the log for that specific message. Put an "X" where appropriate and write out open-ended questions on the line provided. Place your ID number at the top of each message log page along with the date and time of the message.

Please return all logs to Alicia Caldwell in person or put them in my box (ASH 150) in a sealed manila envelope by Monday, October 14, 1996 at the latest.

Please be as accurate as possible because the results will determine the design and stability of the log instrument.

MESSAGES RECEIVED

PARTICIPANT'S ID# _____
 MESSAGE DATE _____ TIME _____

	<u>From within the Org.</u>		<u>From outside the Org.</u>
Sender:	Superior <input type="checkbox"/>	Type:	Business <input type="checkbox"/>
	Peer <input type="checkbox"/>		Personal <input type="checkbox"/>
	Subordinate <input type="checkbox"/>		Both <input type="checkbox"/>
	N/A <input type="checkbox"/>		
	Unsure <input type="checkbox"/>		

Alternate message type (if applicable)

List Serve <input type="checkbox"/>	Faculty Staff <input type="checkbox"/>	Other <input type="checkbox"/>
Read the Message? (entire message)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
(only scanned)	Yes <input type="checkbox"/>	

Was the message appropriate? Yes No

If not appropriate, why? (Can check more than one category)

Receiver not the appropriate person to receive the message

Sender unknown or no interest in contact with the sender

No interest in information content

Other (please specify)

Was e-mail the appropriate channel used? Yes No

If no, what should have been the appropriate channel?

APPENDIX B

Instructions for E-mail Test

The purpose of this instrument is to gather data regarding communication through e-mail within the organization. The two attached logs will help to determine frequency of use (senders and receivers) and purpose, appropriateness, status of users, attention to messages, origination and destination, and type of message.

Outgoing Message Log

Please log each outgoing e-mail message that you send per day for one week (five days). Place an "X" in the box below the four categories (*Recipient Status, **Type of Message, Destination, Initiation and the intended Receiver's Gender if known). Use the codes at the top of the log for clarity of category. Indicate one box per category and write in the date and time for each message sent. Place your participant ID number at the top of the form. Your results will be kept confidential. Return sealed in the envelope provided.

Incoming Message Log

Please log each incoming e-mail message received per day. Be specific when indicating the date and time that the **message was sent to you**--not when you checked the messages that day. Put an "X" in the box below the six categories (*Sender's Status, **Type of message, From, ***Message Sent to, Read the Message, Appropriateness of Channel and the Sender's Gender if known). Use the codes at the top of the log for clarity of category. Indicate one box per category. Place your ID number at the top of the form. Your results will be kept confidential. Return sealed in the envelope provided.

Thank you in advance for your participation in the research study.

APPENDIX C

PARTICIPANT'S ID# _____

E-mail Questionnaire

Directions: This instrument is designed to gather information regarding e-mail use. The questions are composed of seventeen statements concerning feelings about communicating through e-mail within the organization. Please indicate in the space provided the degree to which each statement applies to your feelings by marking whether you:

(1) Strongly Agree, (2) Agree, (3) Are Neutral, (4) Disagree, (5) Strongly Disagree.

- _____ 1. The majority of e-mail messages I send within my organization travel horizontally (in terms of hierarchical level) to other peers.
- _____ 2. Most of the e-mail messages I receive are for business related issues.
- _____ 3. I self-initiate e-mail messages as much as I respond to incoming messages.
- _____ 4. Almost all of the messages I receive are perceived to be appropriate.
- _____ 5. Of those messages deemed inappropriate, it is usually because the message content is not useful.
- _____ 6. I feel that e-mail is useful and enhances communication and productivity.
- _____ 7. I think that my supervisor will feel that e-mail enhances communication and productivity.
- _____ 8. I feel that the amount of time used to send and retrieve messages is productive and beneficial.
- _____ 9. I feel that e-mail is a more appropriate way to send and receive information than memos, meetings, phone calls, faxes, or letters.
- _____ 10. With e-mail I find I have more access to important organizational information than before I had e-mail.
- _____ 11. I feel that I can openly and honestly communicate my ideas and feelings through e-mail regardless of the intended receiver's hierarchical status.
- _____ 12. The amount of time I spend reading a given e-mail message is based on if the information has merit and is appropriate to the job.
- _____ 13. I feel that I only scan the majority of messages I receive.
- _____ 14. I feel that e-mail is a more cost-effective way than written memos to receive and disseminate information within the organization.

- _____ 15. I feel that e-mail is a more cost-effective way than written memos to receive from and disseminate information out of the organization.
- _____ 16. I feel that it is easier to communicate some messages via e-mail rather than face-to-face, by phone, by U.S. mail, etc.
- _____ 17. I feel that e-mail is a faster way to send and receive information than memos, meetings, phone calls, faxes, or letters.

Open-ended Question. Please indicate any other issues of concern here.

- _____ 18. Are there any other issues that are not addressed in the above questionnaire that you would like to express regarding e-mail and organizational communication?

APPENDIX D



Institutional Review Board
For the Protection of
Human Subjects

University of Nebraska Medical Center
Eppley Science Hall 3018
600 South 42nd Street
Box 986810
Omaha, NE 68198-6810
(402) 559-6463
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February 13, 1997

Alicia Caldwell
Department of Communication
UNO - 0112

IRB#: 076-97-EX

TITLE OF APPLICATION/PROTOCOL: The Affect of Computer-Mediated E-Mail Communication on the Flow of Information in an Organization

Dear Ms. Caldwell:

The IRB has reviewed your Exemption Form for the above-titled research project. According to the information provided, this project is exempt under 45 CFR 46:101b, category 2. You are therefore authorized to begin the research.

It is understood this project will be conducted in full accordance with all applicable sections of the IRB Guidelines. It is also understood that the IRB will be immediately notified of any proposed changes that may affect the exempt status of your research project.

Please be advised that the IRB has a maximum protocol approval period of five years from the original date of approval and release. If this study continues beyond the five year approval period, the project must be resubmitted in order to maintain an active approval status.

Sincerely,

A handwritten signature in cursive script that reads "Ernest Prentice/jlg".

Ernest D. Prentice, PhD
Vice Chair, IRB

EDP:jlg

APPENDIX E

...

Questionnaire Items by Gender - t-tests

	Subset	Mean	S.D.	t-value	<i>p</i>
Q1	F	3.71	1.11		
	M	3.40	1.82	0.34	0.74
Q2	F	1.00	0.00		
	M	1.00	0.00	0.00	
Q3	F	4.00	1.41		
	M	3.60	1.52	0.46	0.66
Q4	F	1.29	0.49		
	M	1.00	0.00	1.55	0.17
Q5	F	2.29	1.11		
	M	2.20	1.30	0.12	0.91
Q6	F	1.29	0.49		
	M	1.20	0.45	0.32	0.76
Q7	F	1.29	0.49		
	M	1.40	0.55	-0.37	0.72
Q8	F	2.00	0.82		
	M	1.60	0.55	1.02	0.33
Q9	F	2.57	1.40		
	M	2.60	1.34	-0.04	0.97
Q10	F	2.43	0.98		
	M	2.60	1.14	-0.27	0.79
Q11	F	3.14	1.46		
	M	3.40	1.34	-0.32	0.76
Q12	F	1.71	0.76		
	M	1.00	0.00	2.50	0.05
Q13	F	3.43	1.13		
	M	4.20	0.45	-1.63	0.14
Q14	F	1.71	0.95		
	M	1.40	0.55	0.72	0.49
Q15	F	2.14	0.90		
	M	1.60	0.89	1.03	0.33
Q16	F	2.71	1.11		
	M	2.00	1.00	1.16	0.27
Q17	F	1.43	0.54		
	M	1.80	0.84	-0.87	0.41

Subset F-female (N = 7) Subset M-male (N = 5)

Questionnaire Items by Participant Level - One-way ANOVA

	<i>Source</i>	<i>d.f.</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Q1	Between	5	3.48	5.97	0.03
	Within	6	0.58		
	Total	11			
Q2	Between	5	0.00	0.00	
	Within	6	0.00		
	Total	11			
Q3	Between	5	1.33	0.53	0.75
	Within	6	2.50		
	Total	11			
Q4	Between	5	0.13	0.80	0.59
	Within	6	0.17		
	Total	11			
Q5	Between	5	2.35	5.64	0.03
	Within	6	0.42		
	Total	11			
Q6	Between	5	0.15	0.60	0.70
	Within	6	0.25		
	Total	11			
Q7	Between	5	0.13	0.40	0.83
	Within	6	0.33		
	Total	11			
Q8	Between	5	0.33	0.50	0.77
	Within	6	0.67		
	Total	11			
Q9	Between	5	2.88	3.84	0.07
	Within	6	0.75		
	Total	11			
Q10	Between	5	1.60	3.20	0.09
	Within	6	0.50		
	Total	11			
Q11	Between	5	2.55	2.04	0.21
	Within	6	1.25		
	Total	11			
Q12	Between	5	0.28	0.49	0.78
	Within	6	0.58		
	Total	11			
Q13	Between	5	1.15	1.53	0.31
	Within	6	0.75		
	Total	11			
Q14	Between	5	0.48	0.64	0.68
	Within	6	0.75		
	Total	11			

Q15	Between	5	0.68	0.75	0.62
	Within	6	0.92		
	Total	11			
Q16	Between	5	0.48	0.28	0.91
	Within	6	1.75		
	Total	11			
Q17	Between	5	0.48	1.16	0.42
	Within	6	0.42		
	Total	11			